Marshall Momentum

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VISAR Gives New Focus To Crime Scenes That Are "Caught On Tape"

Marshall Space Flight Center video imaging technology gives new meaning to the phrase "caught on tape." Video Image Stabilization and Registration (VISAR), a new concept in clear video imagery, may soon be helping law enforcement officials around the country solve crimes.

The development of VISAR began over two years ago, when inventors Dr. David Hathaway and Paul Meyer received a request from the Southeast Bomb Task Force of the FBI to improve video of the bombing at the 1996 Olympic Games in Atlanta. NASA software clarified dark, nighttime videotape made with a handheld camcorder, revealing important details that were previously undetected.

Meyer, an atmospheric scientist at Marshall's Global Hydrology and Climate Center, processes weather satellite images. As a solar physicist, Hathaway used video stabilization techniques to enhance images of the Sun. Through the combination of their expertise, they developed a computer algorithm that analyzes frames pixel by pixel. The result is a sharper image.

VISAR improves the clarity of video footage by correcting distortion caused by adverse conditions. VISAR stabilizes camera rotation and zoom effects, produces clearer images, and reduces video noise or "snow." After the footage has been modified, it can be further enhanced through sharpening and deblurring techniques. A video processing algorithm is used to co-align video image fields by removing the effects of translation, magnification, and rotation. This algorithm may be implemented in firmware and hardware.

Because VISAR allows the user to combine several video images together, noise can be averaged out among frames. Generally, VISAR can correct image jitter to about 1/10th of a pixel. It can correct magnification and zoom to 0.1 percent and angles to within 0.03 degrees. The more images combined, the greater the corrective power.

In January, VISAR was introduced at a conference sponsored by the Office of Law Enforcement Technology Commercialization (OLETC), part of

VISAR inventors, Paul Meyer and David Hathaway study a VISAR enhanced image that was captured as a still shot. This technology is now being used by the FBI.

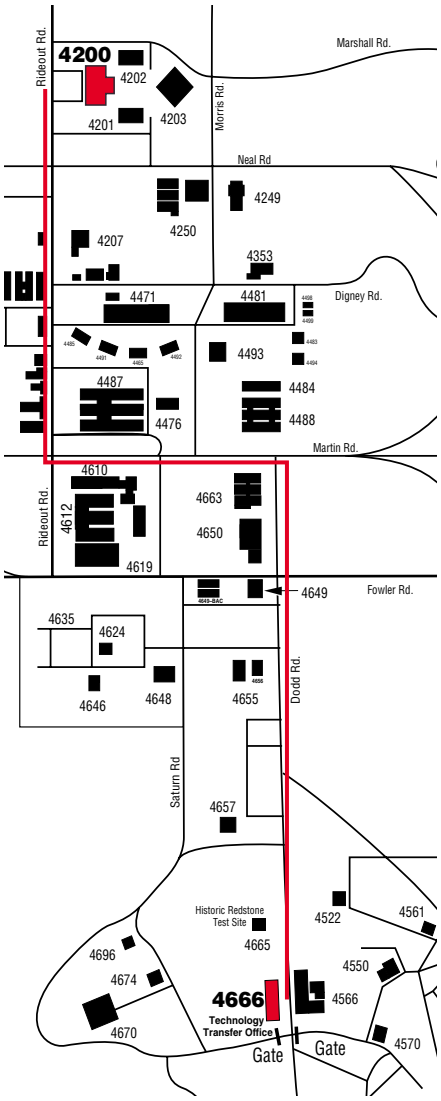
the National Institute of Justice. Using a prepared video of a mock car chase, VISAR was able to clarify the license plate of a car. In another example, using home video footage taken from Headline News coverage of a 1998 bombing in Ireland, VISAR was able to clarify a face in the crowd that was a complete blur in the original version.

One of the many applications for VISAR includes law enforcement and security video. The technology's ability to identify faces in a crowd can be especially useful at capturing arsonists, since they tend to witness their crimes in progress. There are many uses for VISAR beyond law enforcement, as well. For instance, the technology can be applied to meteorology, to track cloud formation and storms. Other uses are medical imaging, scientific applications, instant replays of sporting events, and home videos.

The inventors worked with the Technology Transfer Department and Commercialization Assistance lead, Sammy Nabors, to patent their invention. In March an industry briefing was held to discuss the commercialization opportunities and licensing process with several companies from around the country. The office has received multiple applications to license VISAR.

Restructuring for the Future

Marshall Space Flight Center completed a centerwide reorganization on May 23. To help accommodate several offices that have moved as part of the Marshall Center's reorganization, the Technology Transfer Department has been temporarily relocated to building 4666. We anticipate returning to the Von Braun Complex during the fall of 1999.



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Quick-Connect Fastener License Agreement Signed

Marshall Space Flight Center's Technology Transfer Department has signed a nonexclusive license with M&A Screw and Machine Works of Philadelphia for the Marshall developed Quick Connect Fastener.

The fastener was invented by Bruce Weddendorf. It evolved from technology used in the Pathfinder, a project dedicated to in-space assembly techniques for easy assembly in weightless aerospace environments.

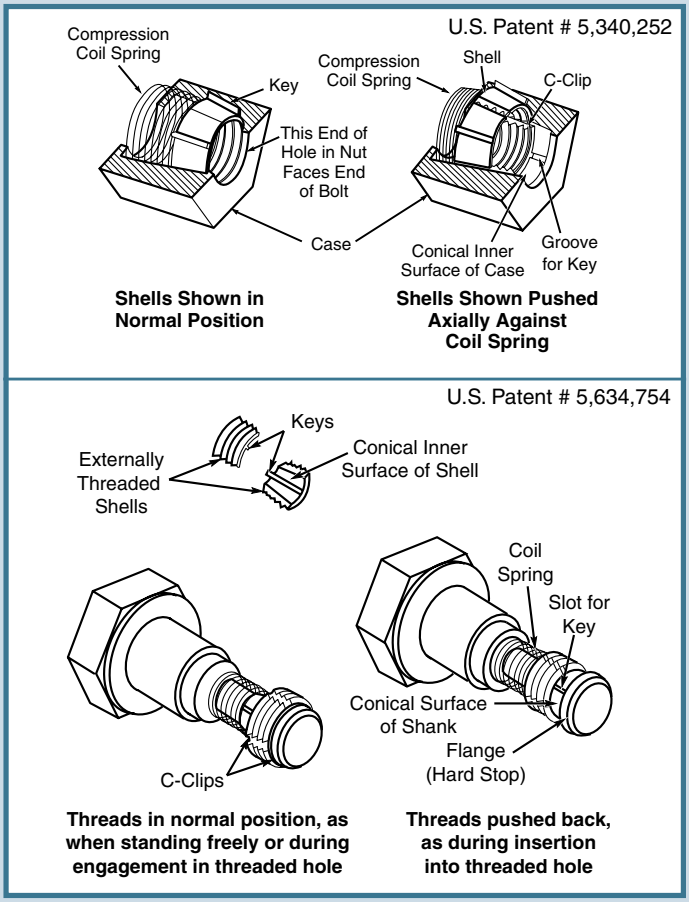
The Philadelphia company, producer of conventional nuts and bolts, worked through Ben Franklin Technology Center, also in Philadelphia, to negotiate the license. Ben Franklin, an economic development firm, works with companies seeking solutions through new technologies.

M&A Screw and Machine Works learned about the new technology from the Mid-Atlantic Technology Applications Center, a Regional Technology Transfer Center in Pittsburgh.

The design permits the nut to be installed simply by pushing it onto a standard bolt or threaded stud. Once installed, it can be removed only by unscrewing it in the manner of a conventional nut. The bolt operates in a similar manner. It is installed by pushing it directly into the hole on a nut. It is unscrewed in the same manner as a conventional bolt.

The quick-connect fastener technology can be used for firefighting equipment, high- compression gas bottles, underwater salvage equipment, and in industrial applications such as assembly line machinery and industrial cranes.

M&A's expertise and standard automated equipment will enable the production of quick connect fasteners at its Philadelphia location.



Quick-Connect Fastener Commercialization Options:

Applications for Quick Connect Fastener:

- Lug nuts for racing cars
- Firefighting equipment
- High-compression gas bottles
- Underwater salvage equipment
- Industrial applications:
  assembly line machinery
- Industrial cranes

Technical Aspects of Quick Connect Fastener:

- Conventional nuts and bolts usages
- Unlimited shelf life
- Useful in situations where speed is desirable
- Virtually fail safe

The Quick-Connect Fastener is patented by NASA and is available for transfer to industry, particularly for use in applications where there is a need to make rapid, secure connections in difficult working conditions.

Light-Driven Waste Remediation System Utilizing Phototrophic Bacteria

An MSFC Small Business Innovation Research (SBIR) effort with Micro-Bac International, Inc., has resulted in a new system for the treatment of wastewater based upon the metabolic activity of phototrophic bacteria. This system requires no aeration, uses sunlight as an energy source, and does not generate carbon monoxide. It offers significant advantages over conventional waste-treatment systems in terms of flexibility, safety, and performance. In geographical areas with adequate amounts of sunlight, the system is considerably more cost-effective than traditional activated sludge aerobic systems.

Developed and manufactured in its Central Texas research laboratories, Micro-Bac's biological solutions are composed of a proprietary combination of bacteria used to accelerate the natural degradation of wastes not only in wastewater systems, but also in food processing and animal waste collection systems. The microorganisms developed as part of the NASA SBIR contract are presently being sold as a liquid product, Mega-Bac TF, which works on the degradation of fat, oil, fecal matter, and other biologically derived wastes.

Implications of the system are numerous, as water purity is of increasing concern. Potential applications include wastewater treatment for agriculture, small communities, individual homes, isolated military installations, food processors, and chemical manufacturing. The technology applied by Micro-Bac was originally developed for Space Station applications. Micro-Bac is actively pursuing a contract with a multinational glass producer to manufacture and distribute the treatment cells.

A meat processing plant accumulated a massive grease and scum problem in its system of ponds and lagoons. After three weeks treatment with Mega-Bac®, the grease was digested in this lagoon. The odor improved dramatically as well.

Paper Trail

Scientific and Technical Publications

Recent Scientific and Technical Publications Available in Marshall Library

NASA/CP-1999-209258, Third Aerospace Environmental Technology Conference

NASA/CP-1999-209261, 11th International Conference on Atmospheric Electricity

Tech Briefs

Tethered Transportation (HYPERLINK http://infinity.nsfc.nasa.gov), June Issue

NASA Selects Top Inventions of the Year (HYPERLINK http://www.nasatech.com), May Issue

Space for Business (HYPERLINK http://microgravity.gov), May Issue*: Showcases SBIR with Quantum Devices on photodynamic cancer therapy*

Ship Building 101

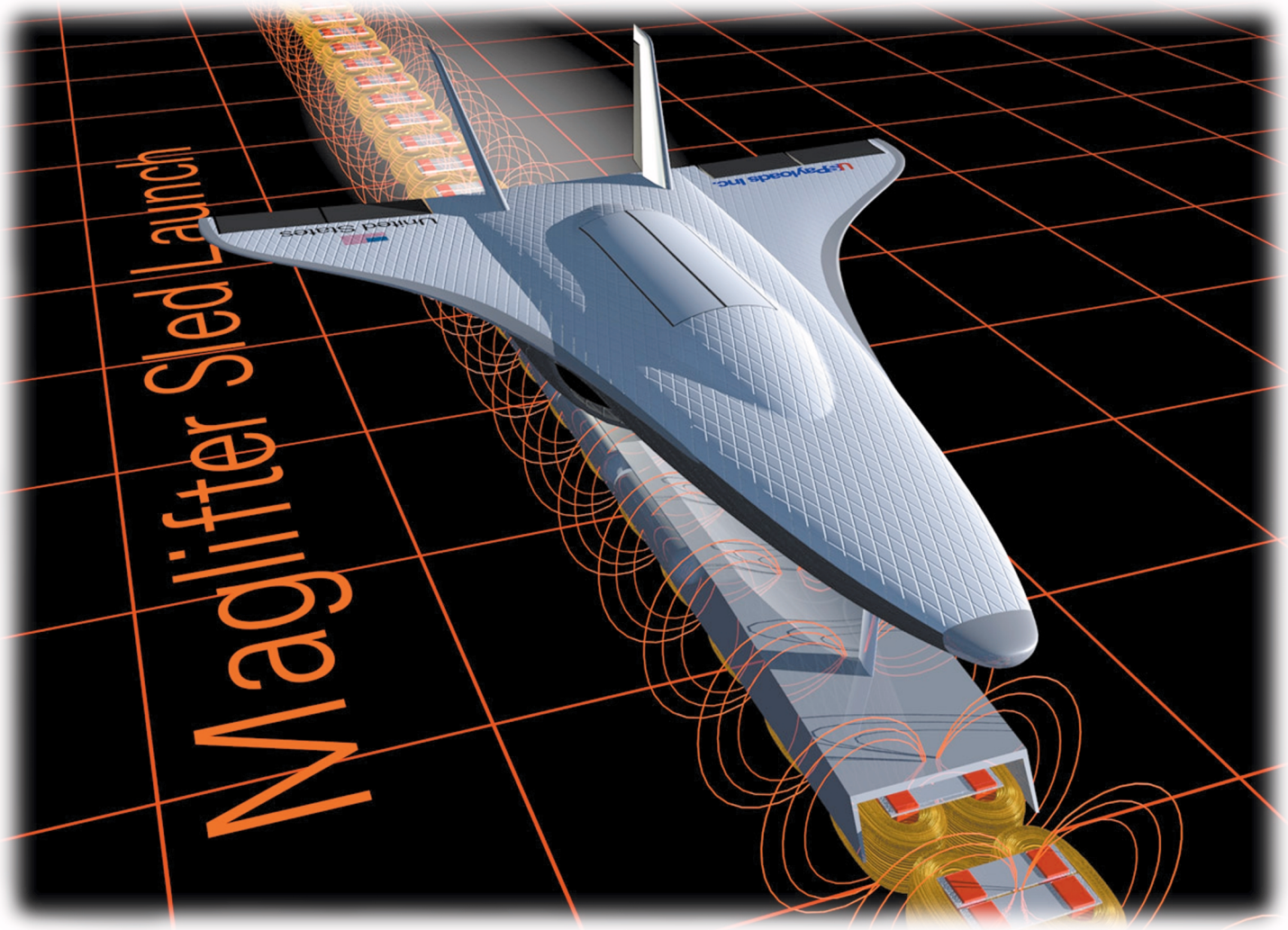
Maglifter, a Marshall-managed technology development, is a magnetically levitated and magnetically propelled launch-assist system developed for the Bantam project. The goal of sending small payloads to orbit at a price of $100's per pound is the thrust behind developing Maglifter.

Maglifter Statistics:

- Fully reusable zero stage for vehicle propulsion
- Propels 120Klbs. vehicles at 2g acceleration to 600 feet per second
- Uses low cost propellant (Electricity)
- Initial velocity boost allows vehicles to eliminate significant weight
- Very low maintenance
- Carrier floats on magnetic field (no friction)
- Guideway will be approximately a mile in length
- Guideway has no moving parts other than the carrier

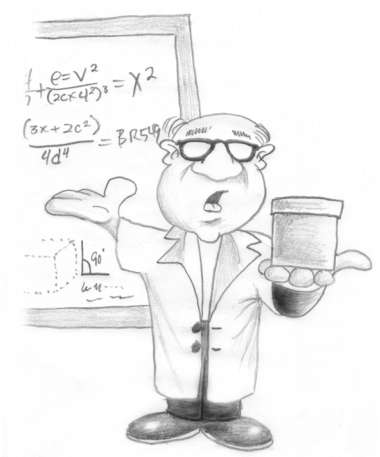
Commercial Applications in Development:

- Maglev Trains
- Small personnel transport
- Amusement Park rides (i.e. roller coasters)
- Aircraft launch

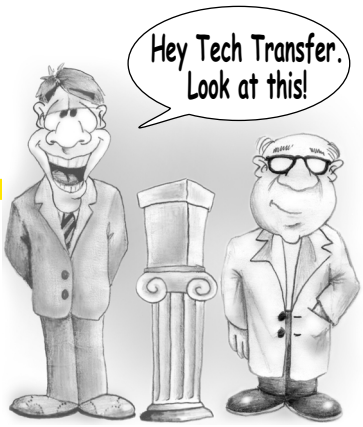


The Technology Commercialization Process

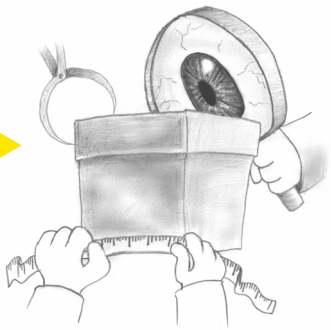
Inventors



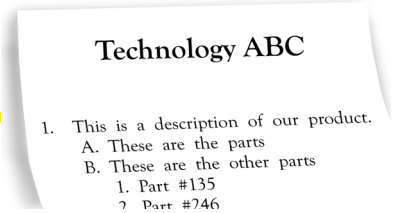
Invention Disclosure
(New Technology Report)



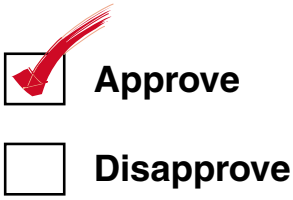
Commercial Assessment



Patent Application

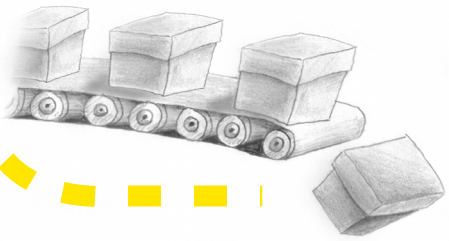


Patent Issued

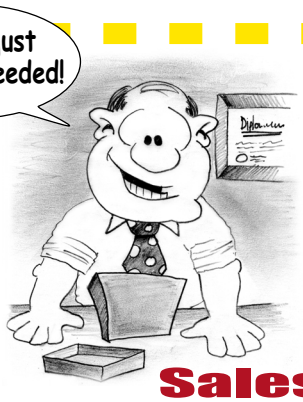


License

Production



Sales



Royalties

Marshall Program Notes

Chandra Update:

The primary objective of the STS-93 mission was sucessfully completed on July 23, 1999 as the Chandra X-Ray Observatory was deployed from Space Shuttle Columbia. Chandra Flight Director, Lewis Wooten of Marshall Space Flight Center, reported all systems and subsystems on the spacecraft were operating as expected.

Chandra, the world's most powerful X-ray telescope, is slated for a five-year, highly elliptical orbit.The observatory will provide unique and crucial information on the nature of objects ranging from comets in our solar system to quasars at the edge of the observable universe.

The Chandra X-ray Observatory program is managed by the Marshall Space Flight Center for the Office of Space Science.

X-37 Update:

A cooperative agreement was formally established on July 14 between NASA and Boeing to build and fly the X-37 space plane. The X-37 will extend the testbed envelope to orbital capability, access higher altitudes, and expand on-orbit Shuttle capabilities.

Optics Update:

The Microgravity Research Biotechnology Brilliant X-Ray project was cited in the May 1999 issue of *Optical Engineering*. The article focuses on the new potential of x-ray optics in the area of polycapillary, nested cone, and multilayer graded optics. These new approaches to x-ray optics are expected to lead to improvements in biotechnology research and a variety of applications in scientific research, medicine, and industry.

Tech Transfer Bulletin Board

Marshall Space Flight Center has signed software usage agreements with Wright-Patterson Air Force Base, Georgia Tech, Iowa State, and Boeing/ Rocketdyne for the use of the MAVERIC software package developed by MSFC. MAVERIC is a simulation code developed by MSFC's Engineering Directorate. It contains models of X-33 and VentureStar Subsystems and simulates flight with these models and MSFC's guidance and control algorithms.

A reimbursable Space Act Agreement has been executed between Concurrent Technologies Corporation (CTC) of Johnstown, PA, and MSFC. A new CTC program will assess new technologies for the Marines' Advanced Amphibious Assault Vehicle (AAAV). CTC would like to draw from MSFC's friction stir welding expertise developed for the super-lightweight external tank.

Marshall Space Flight Center hosted the quarterly meeting of the NASA Commercial Technology Management Team (NCTMT) in Nashville on May 4-5, 1999. The meeting brought together the heads of all the Technology Transfer Offices across the Agency plus representation from affiliated contractors and Agency Enterprises.

Marshall's Technology Transfer Department has recently completed a concurrence for the Space and Missile Defense Command (SMDC) partnership for Wind Tunnel Testing.

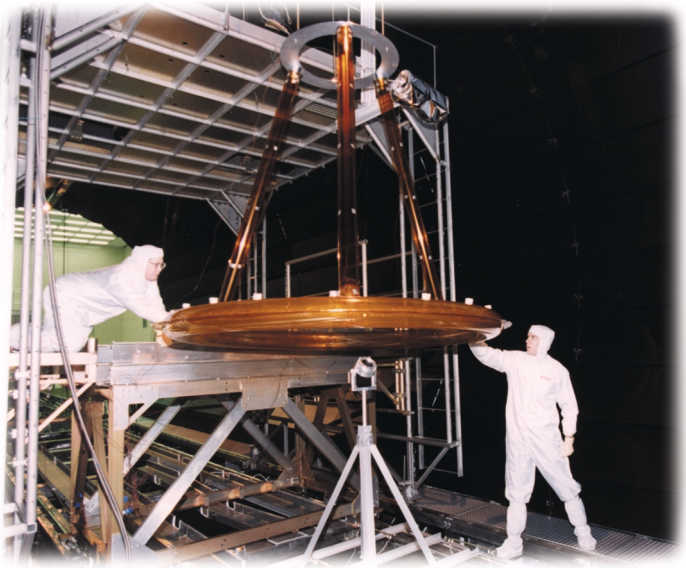
A second concurrence has also been completed for a reimbursable Agreement with the Naval Warfare Center for Hot Gas Testing for Advanced Materials.

Von Braun's Notebook

recognizing Marshall's people . . .

Marshall Space Flight Center's ***Greg Schunk*** *was the driving force behind the first-ever thermal cycle and modal survey test series. Greg developed the idea to utilize the X-Ray Calibration Facility (XRCF) to test the full-scale inflatable structure for the Shooting Star Experiment/ Pathfinder III article, and pulled the team together to implement the testing.*

Jeff Kegley *was the senior test engineer at the XRCF. He managed the testing and lead the test group through many days of around-the-clock testing.*



Promoting Marshall Technology

Birmingham, Alabama, hosted its first annual **Automated Manufacturing Exposition** May 4-6, 1999, at the Birmingham Jefferson Convention Center. Marshall technologies and facilities highlighted at this show were High-Strength Aluminum Alloy, VISAR, Stepper Motor, Thermal Gasket, and the Productivity Enhancement Complex.

TABES 1999 was held at the Von Braun Center in Huntsville, Alabama, May 18-19. Marshall's prominent presence in the exhibit hall include booth displays by Technology Transfer, Space Product Development, Microgravity, International Space Station, X-33/X34, FASTRAC, and the Shuttle main engine.

The Society for the Advancement of Materials and Process Engineering (**SAMPE**) 1999 was held on May 23-27 at the Long Beach Convention Center in Long Beach, California. An estimated 12,000 people turned out for this year's annual event. Marshall Space Flight Center's Technology Transfer Department, in conjunction with NASA Headquarters, Langley Research Center, Glenn Research Center, Kennedy Space Center, Johnson Space Center, and the Jet Propulsion Laboratory, highlighted 18 Technology Opportunities, including Marshall's High Strength Aluminum Alloy.

Website Statistics nasasolutions.com

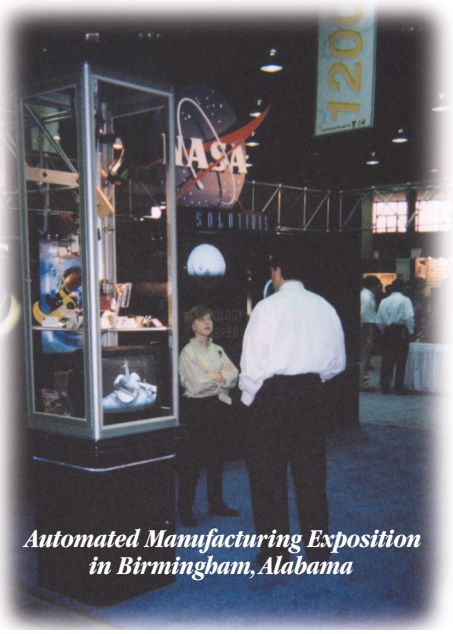
Total # of hits in 30 days: 62,970
Average # of hits per day: 2,031

Top 5 Most Requested Pages

- Technology Transfer Home Page
- At Home With NASA Technology
- Technology Opportunities At MSFC
- Research & Technology Annual Report
- Technology Transfer Recent Headlines

Top 5 Most Downloaded Pages

- Composite Materials.pdf
- Tribology.pdf
- PEC.pdf
- Structural Testing.pdf
- VISAR.pdf



Automated Manufacturing Exposition in Birmingham, Alabama

TABES `99

Oscar, the talking robot, at TABES `99

Marshall's Deputy Director, Carolyn Griner, speaking at TABES '99

Momentum Moment

"Throughout all that we do, we are going to push the frontiers of technology. And we will do so in partnership with industry."

Dan Goldin
NASA Administrator

"Technology Transfer is very dear to me. We (MSFC) are world leaders in access to space and the use of space for research and development to benefit humanity."

Art Stephenson, Director
Marshall Space Flight Center

"Commercializing technology is a cornerstone for both NASA's and America's continued success. Applying new technology saves NASA and industry valuable R & D resources and speeds up the deployment of innovations that enhance our nation's economic competitiveness, provide better health care, and raise our standard of living."

Sally Little
Technology Transfer Department

The technologies we need to reach the stars are the engines to drive America's future.

Calendar of Events

September 16 STS-99 Target Launch Date		***September 26–29*** 53rd National Conference on the Advancement of Research Huntsville, AL		***September 27–29*** Appliance Manufacturer Conference and Expo, (AMCE) Nashville, TN
	October 5 5th Huntsville Gamma Ray Burst Workshop		***October 5–7*** International Society for Measurement and Control, (ISA) Philadelphia, PA	
October 14 STS-103 Target Launch Date	***October 20–22*** Federal Laboratory Consortium Southeast Regional Meeting Panama City, FL	***November 1-3*** Tech 2009 Miami Beach, FL	***November 3–5*** Inspection Day `99 Houston, TX	***December 2*** STS-102 Target Launch Date

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